LABOR MARKET IN SOFIA

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1. Introduction

A number of indicators on the state of the Bulgarian labour market have been at record levels in the past five years but in no region is development as rapid as in Sofia. This text seeks to examine in detail the dynamics of employment, unemployment, the structure of education, wages and demographic development in Sofia, as well as to present the most likely scenario for its development in the near future. The results of the forecast of the labour force and the labour market give an outlook for evolutionary rather than revolutionary development in the near future—partly because of the expectations for slowing economic growth in the country, partly because of the fact that Sofia is already reaching the limits of its currently recognised potential.
2. Literature review in the field of labour market forecasting

One of the econometric models that examines the link between economic growth at national and regional level is that of Bell (1967). To test his model, Bell makes a long-term forecast for the economic activity in Massachusetts, USA, using state data, excluding gross national product (GNP). The concept of regional economic growth by increasing exports to neighbouring regions is the model's basic idea. As the GDP of a given region grows, so do its exports. This induces a multiplicative process, through which local income increases. Bell estimates that Phillips’ hypothesis of an inverse relationship between unemployment and real wages does not apply locally (at least to Massachusetts). The unemployment rate is in direct proportion to the natural increase in the workforce and the increase in the real wage, but in inverse proportion to the change in GDP.

To forecast labour market activity in the short term, David and Otsuki (1968) use a Markov model to describe the transition between periods of employment, unemployment for less than a month, unemployment for more than a month and economic inactivity. The birth and mortality processes affect the matrix since persons who do not participate in the group in period t-1 will participate in period t and vice versa. These processes, however, are proportional to the population, so we can derive the correct transition matrix by normalising each group (employed, unemployed, economically inactive) by the number of adults for each period considered. The data used in the David and Otsuki study are from the Current Population Survey and monthly labour market reports. Given the appropriate parameters for David and Otsuki’s hypotheses, estimates can be made for the transition of persons to the group of the employed or the unemployed, given a certain level of unemployment.

Rumberger and Levine (1985) examine the impact of new technologies on the labour market. They look at several forecasts that are based on different methodologies. The Bureau of Labour Statistics (BLS) determines the forecast for the number of employees in a given industry using projections for production growth, labour productivity gains and staff composition. The National Science Foundation (NSF) examines trends in university enrolment to forecast the academic community’s needs for personnel in the natural sciences and engineering fields, as well as the trends in new technology development to determine the industry's requirements for its future employees. The Institute for Economic Analysis (IEA) applies a model similar to that of the Bureau of Labour Statistics. The BLS model results show that in the future there will be an increase of jobs for professionals who create new technologies, but also a decline in the search for personnel whose activities can be automated. According to the IEA, the number of jobs depends not so much on economic growth but on the adoption of new technologies.

One of the models for assessing the state of the regional economy and forecasting the demographic situation is the model by Treyz, Rickman, and Shao (1991). It can assess the effects of economic development programs, investment in transport infrastructure, environmental improvement projects, energy and natural resource conservation programs, changes in the tax system, and more. The model looks at transactions between different industries, as well as information on final consumption, including consumption, investment and government demand. To test the dynamics of the model, two tests were conducted – external shock in supply and demand. As a result of the external demand shock, there was a sharp increase in employment in the first year, leading to an increase in nominal and real wages. Growing wages increase immigration, and thus real estate prices, leading to a reduction in real wages.
In his scientific paper, Rothman (1998) looks at the problem of asymmetric unemployment rates and argues that nonlinear time series models would optimize the predictions of traditional linear ones. In order to test his thesis, he uses the following nonlinear models: exponential autoregressive (GAR), generalized autoregressive (SETAR), smooth threshold autoregressive (STAR), bilinear, and time-varying autoregressive (TVAR). Rothman finds that nonlinear models are often more accurate than linear ones, especially when it comes to relatively rapid changes in labor market performance.

Blien and Tassinopoulos (2001) forecast regional employment in West Germany for a 2-year period using the ENTROP method. It allows to optimize entropy and calculate matrices derived from heterogeneous information. The advantage of this model lies in its flexibility and ability to use different types of information. The forecast for a specific year is made using a matrix that combines data for both the concrete area and industry concerned. The model estimates are more accurate than the estimates generated through standard methods. The model is so reliable that it is used by the German Federal Employment Services, which formulate and implement labor market policies based on it.

Franses, Paap, and Vroomen (2004) predict unemployment using autoregression with censored latent effect parameters. The method includes autoregressive time models with time-varying parameters, and these variations are dependent on a linear variable indicator. To test it, the model was used to predict unemployment in three G7 countries – the US, Canada and West Germany – and the outcomes were compared with results obtained through other similar models. The data shows that applied to the US and Canada, the model of Frances, Paap and Vroomen gives a more accurate estimate of unemployment rates than other widely used methods, and for West Germany, the obtained results do not vary much from the values predicted by other models.

The model developed by Longhi, Nijkamp, Reggiani & Maierhofer, predicts regional unemployment by using an artificial neural network. After comparing it with other models for regional unemployment forecasting, we can note its ability to use unclear and incomplete information as one of its advantages. Although it gives a pretty accurate estimate of the relationship between dependent and independent variables, it is difficult to interpret. To test the characteristics of the model, it was used to predict unemployment in 327 regions of the former West Germany. The results showed that this model based on artificial neural networks provided more accurate information on the future value of the unemployment indicators than the models used by the German authorities. It is important to note that this model allows for time-constant parameters, which are quite subjective, and their actual implementation would require additional complication, including time-varying parameters.

Another suggestion for measuring employment is that of Wang (2009), who uses the ARIMA model for employment estimation. The model was tested to forecast employment in the IT industry for 2008, using data from 2002-2007. After the testing, the model was found to be reliable enough for forecasting purposes, but its precision can be improved by adding more data sources. The model’s disadvantage is that it is more suitable for short-term forecasts.
3. Labour market status and trends in Sofia

3.1 Structure and dynamics of employees in Sofia (2013-2018)

The global economic crisis had a deep and lasting impact on the Bulgarian labour market. It was not until 2013 that employment began to increase and unemployment dropped. In the period of recovery and economic growth that followed, labour market indicators reached historic levels, with this positive trend being particularly evident in the Sofia region.

In 2018, the employment rate exceeded 75% for the population aged 15-64 – a value close to the results of EU’s most economically advanced regions. This means that the number of employees in active age has come close to its natural maximum. Employment rates of over 80% of the active population can be observed very rarely (at least in OECD and EU countries).

Figure 1: Employment dynamics in Sofia by quarters and by gender, in thousands, 2013-2018

The analysis reveals that because of the nature of the methodology applied by the NSI, the average annual data on the number of employed persons in almost all cases exceed those for any quarter. Therefore, we have reason to believe that quarterly data slightly underestimate the employment rates in the city. At the same time, they give a more detailed picture of the seasonality and dynamics throughout the year. There are also differences between employment estimates according to various NSI surveys – the Labour Force Survey, which we use here because of the higher data frequency, systematically estimates the number of employees lower than the Structural Business Statistics.

Nevertheless, we can safely say that during the period under review, between 50 000 and 70 000 new jobs were created, depending on the quarter. Employment dynamics by gender distinguish Sofia from the rest of the country.
In most regions of Bulgaria, despite the relatively even distribution of the population between the two sexes, male employment is significantly higher – in 2018, the average employment in Bulgaria in the age group over 15 years of age was 58% among men and 47% among women. In Sofia, the employment rate among men is also significantly higher, but the presence of a slight imbalance in the distribution of the population as a whole (52% female versus 48% male) leads to an even distribution of employees by gender. For the whole period after 2013, in only one of the quarters under review (Q1 2017), the difference between the number of employed men and women in Sofia exceeds 20 000, which indicates a high degree of gender equality.

The educational structure of the employed also distinguishes Sofia from the rest of the country. While the overall labour market is clearly dominated by those with secondary education – a total of 1 802 000 in 2018, compared to 997 000 with university degrees – the balance in Sofia is in favour of those with higher education.

Figure 2: Employee dynamics in Sofia by quarters and by level of education, in thousands, 2013-2018

At the beginning of the period under review, there is a slight predominance of employees with secondary education, but in recent years there has been a significant increase in the proportion of those with higher education. This is the result of two separate trends – on one hand, the share of graduates with higher education in the municipality is gradually increasing, and on the other, ICT, outsourcing and similar services are becoming increasingly important in the local economy, and those attract more qualified staff with higher education. Another interesting trend is the increase of employees with secondary and lower education – it is probably a sign of the gradual depletion of easily accessible labour force in Sofia and the associated increased willingness of some employers, especially from lower-tech industries, to hire people with most basic skills and to train them in the course of work. The construction sector, which intensifies in times of economic growth, has played a similar role, and the last few years in Sofia are no exception.
The age distribution presented in Figure 3 largely corresponds to the labour distribution in most of the developed economies. The age groups of people between 30-39 and 40-49 years old have the highest weight: together they make up more than half of the employees at the end of 2018. This is largely expected, since at this age almost everyone has completed their education and is most suitable for employment. The employment rates of 50-59 and 15-29 year-olds are almost equal (the latter age group unites two age groups, because of the small number of employees under 20 years of age). As expected, the number of those near and at retirement age is lower.

The dynamics of employment in the different age groups is of great importance for the future structure of the workforce in the city, so we examine in detail the status and trends in the five-year age groups published by the NSI. There is a significant increase in the number of employees in almost all age groups except for the youngest citizens, which is probably a consequence of the improved scope of the education system and the general demographic processes. There is also a decline in the age group between 50-54 years, but the explanation for this contraction is probably the volatile nature of employment in this group, as it fluctuates between 82 000 and 103 000 people during the considered period.
The employment structure in Sofia has also changed significantly over the past five years. Three economic activities (broken down by NACE.BG-2008 classification) show a decrease in the number of employees. In health care, the decline reflects, in particular, the sharp shortage of staff and the strong competition from the increased demand in foreign markets, which manage to attract both some graduates and some practitioners. More interesting, however, is the contraction in trade, which is a consequence not so much of a steady downward trend in the number of the employed, but of their great volatility and pronounced cyclicality. However, the explanation of the dynamics in the fastest growing industries is much clearer. The entry of foreign companies and the creation of new local ones in the IT sector – and its crucial importance for the economy of Sofia, explains the significant increase in the number of employees in information and communication technologies. Two other sectors also show impressive results – "professional activities and research" and "administrative and support activities", with a total increase of almost 20,000 people. These two activities include the business services outsourcing – the sector that has created most of the new jobs in the last decade following the entry of several key global companies and the expansion of their operations. Another noticeable trend is the growth of employees both in construction and real estate operations, reflecting the dynamics of prices, the number of transactions and growing number of new construction projects, largely supported by higher incomes and easier access to housing loans.
The structure of employees by economic activities in Sofia differs significantly from that in Bulgaria as a whole. This is most evident in the role of the manufacturing industry – while at national level it is the leading industry with 600 000 employees in 2018, in Sofia it is smaller than both the trade and, more recently, the ICT sector. This difference can be explained by the fact that the majority of industrial production is located in the Sofia region, due to its purely geographical advantages. However, this does not in any way mean that the markedly industrial Sofia region is not very closely integrated with the city (Sofia-city), whose profile is gradually changing in the direction of expanding services and high technologies, and not few of those working in the industrial enterprises of Sofia region live in the city. The explanation for agriculture is similar – a major sector for the labour market in a number of regions, which provides jobs to 200 000 people in the country while employing only 2 000 workers in Sofia. The territorial and geographical conditions in the city suggest a lack of both arable land and conditions for livestock farming.
3.2 Structure and dynamics of the unemployed in Sofia (2013-2018)

The characteristics of unemployment are of particular importance when predicting the future dynamics of the labour market. First, we have to clarify that between 2013 and 2018, unemployment in the region has shrunk from 8.2% to 2.1% and is already on the verge of "natural" unemployment – crossing it means stagnation in the labour market. For this reason, the ability of currently unemployed people to fill the new jobs is relatively low. From the beginning of 2013 until the end of 2018, the number of unemployed in Sofia decreased from 60 000 to 13 000. The total distribution of the unemployed and the distribution by gender are presented in Figure 6 below.

![Figure 6: Quarterly unemployment dynamics in Sofia by gender, in thousands, 2013-2018](image)

**Source:** NSI, Labour Force Survey

The distribution of the unemployed by gender is largely in line with that of the employed. At the beginning of the period under consideration, the gap between men and women is significant. Nevertheless, by its end the difference is diminished in line with the decline in unemployment. Overall, the data do not reveal a significant difference between job seekers by gender.

However, there are significant differences in the structure of unemployment by educational level. At this stage of development of the labour market in Sofia there are hardly any unemployed with higher education – by the end of 2018 they are only about 3 000 people. Due to the small number of unemployed, this estimate has relatively low statistical accuracy, and for the rest of the year it varies between 5 000 and 6 000 people. The number of unemployed with secondary and lower education has also dropped significantly, decreasing from 40 000 on average in 2013 to just under 10 000 on average in 2018. However, the educational structure poses additional challenges as a significant part of new employment is created in the field of ICT and outsourcing services, which prefer applicants with higher education and higher level of skills.
The age structure of the unemployed is also important for potential employers. In terms of employability, certain age-specific characteristics need to be taken into account – the younger population, according to the prevailing understanding, is easier to train and generally more flexible; the older population, on the other hand, is more experienced. Figure 7 below presents the differences in unemployment between age groups. For reasons of statistical accuracy, the age groups are aggregated to a higher level than the distribution of employees previously presented.

**Figure 7: Unemployed in Sofia by age group, in thousands, 2013 and 2018**

![Unemployed in Sofia by age group, in thousands, 2013 and 2018](image)

*Source: NSI, Labour Force Survey*

Together with the sharp overall decline in unemployment across all age groups, its structure changes as well between 2013 and 2018. The share of the unemployed over 45 years old increases, mainly at the expense of those between 15 and 34 years. This, in turn, creates additional barriers to filling the new jobs by the unemployed. The most significant expansion of employment is in the services and high-tech sectors, where job specifics and required skills and education explain employers' preferences for younger people.

### 3.3 Structure and dynamics of wages and labour costs (2013-2018)

High wages, along with benefits, are among the main factors that determine the attractiveness of different industries and professions; the Sofia market is characterised by a growth in the sectors that generally pay nominally high wages. Although wages in the city as a whole are significantly higher than in most municipalities in the country (practically all but the energy and extraction centres), there are quite significant differences in their value and growth in recent years.
The high overall level of average wages in Sofia can be explained by the wages and employment levels in several economic sectors. **Information technology** is the leading sector with wages almost one third higher than those in the next best-paying economic sector. In seven of the sectors, the average monthly salary is over BGN 1 500. However, the differences between the ICT and outsourcing sectors and those with lower pay remain considerable. There is currently no prerequisite for these differences to diminish in the near future, as the highest wage sectors are also those with the potential for the fastest growth in labour demand, which will put additional pressure for salary increase. An exception is the manufacturing industry, where the average wage increased by 53% over the period considered while in most activities the wage growth was lower – between 25-40%.

It is also noteworthy that in Sofia, there is a significant difference between the average pay of men and women – about 15% within the period considered. However, while this value is by no means negligible, it is both below the EU average and the national average. The reason for the pay gap is to a large extent in the employment structure and the fact that higher-paid economic activities attract far more men than women – as far as technical professions are concerned, Bulgaria has one of the best gender balances in the EU, however, there is still a significant male predominance.

In general, employers' labour costs follow wage dynamics; this is expected given that net salary is their major component. We present these costs below, as they give an idea of the real price employers have to pay in order to create a new job in the industry.

It is worth noting the changes in levels of insurance over the last few years (notably the increase in the pension contribution), which also affect labour costs. Figure 9 presents the dynamics of labour costs in the five sectors where they are the highest in Sofia, as well as the average labour costs.
Figure 9: Dynamics of labour costs in selected activities in Sofia by quarters, in BGN, 2013-2018

Source: NSI

3.4 Trends in education

Higher education and vocational education are key to the future dynamics of the labour market. Non-formal education and training is not yet pervasive in Bulgaria, but for some professions, especially high-tech ones, it is already one of the main mechanisms for developing skilled personnel. The state and changes in these industries largely predetermine the skills and direction of expertise of entry-level workers.

When reviewing the data, we have to bear in mind the special place of Sofia in the education system of Bulgaria – it is home to most of the leading universities and a large number of students.

Figure 10 represents the percentages of the various areas of education according to the national classification of fields of education and training from 2015. Bachelor’s and Master’s graduates in Sofia in 2018 are almost 21 000 people in total. Almost one fifth of them are in the field of business and administration, also as many in the social sciences if we combine several of the following categories.
Figure 10: Distribution of 2018 graduates by field of education in Sofia

<table>
<thead>
<tr>
<th>Field of Education</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business and administration</td>
<td></td>
</tr>
<tr>
<td>Social and behavioural sciences</td>
<td></td>
</tr>
<tr>
<td>Engineering and engineering trades</td>
<td></td>
</tr>
<tr>
<td>Health care</td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Arts</td>
<td></td>
</tr>
<tr>
<td>Information and communication technologies (ICTs)</td>
<td></td>
</tr>
<tr>
<td>Journalism and information</td>
<td></td>
</tr>
<tr>
<td>Architecture and construction</td>
<td></td>
</tr>
<tr>
<td>Personal services</td>
<td></td>
</tr>
<tr>
<td>Law</td>
<td></td>
</tr>
<tr>
<td>Languages</td>
<td></td>
</tr>
<tr>
<td>Humanities (except languages)</td>
<td></td>
</tr>
<tr>
<td>Physical sciences</td>
<td></td>
</tr>
<tr>
<td>Engineering, manufacturing and construction</td>
<td></td>
</tr>
<tr>
<td>Biological and related sciences</td>
<td></td>
</tr>
<tr>
<td>Manufacturing and processing</td>
<td></td>
</tr>
<tr>
<td>Welfare</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>

Source: NSI

As the national classification has been used to distribute students by field of education for only two years, tracking back the dynamics of graduates is more difficult. However, the drop in the total number of graduates in Sofia – in 2013 there were almost 3 000 graduates more than in 2018 – is noticeable. For the two years for which data are comparable, namely 2017 and 2018, there is no significant difference in the shares of the different fields of education, with the most noticeable decline being in the architecture and construction major (-1.2%), and the most significant growth is in security (+1.1%), but in no case can it be said that these changes are systematic.

In the 2018/2019 academic year, 13 700 children were enrolled in vocational schools, according to the Regional Office for Education. The structure of the majors is diverse – from economics, through high-tech to tourism. Of these, 2 700 are in the twelfth grade, with the highest number being students in the two economics schools, the two computer technology schools, the tourism high-school and the architecture, construction and geodesy school.

3.5 Features of the demographic development of Sofia

The future status of Sofia’s workforce is inextricably linked to the city's demographic and economic development. The peculiarities of the demographic and the economic development of Sofia are of particular importance in forecasting its labour market, since the trends in the Capital differ quite a lot from those in most regions in the country.

While alarming data on population decline are reported in most Bulgarian regions, so far demographic indicators remain relatively positive in Sofia. Although its natural increase is negative (-1.9% in 2018), the gap between the birth rate and the death rate in Sofia has been the most favourable in the country for a decade, with a tendency to continue shrinking.
It is not the first time in a period of economic upswing that natural growth has improved significantly, with 2009 even having a positive value of 0.2‰. The other indicator that determines the dynamics of the population is the mechanical growth, which, again, unlike most regions, is positive for the whole period since the beginning of the millennium. Although the pace of relocation to Sofia is far behind the pace that occurred in the first years after 2000, positive net migration remains an important factor in maintaining the growth of Sofia’s population. As a result of the demographic trends described, the number of residents in the city rose from 1.18 million in 2001 to 1.33 million in 2018.

As we are most interested in the workforce profile, Figure 11 presents the change in population over the age of 15.

**Figure 11: Dynamics of the able-bodied population in Sofia by age groups, 2011-2018**

![Graph showing the dynamic of the able-bodied population in Sofia by age groups from 2011 to 2018.](image)

*Source: NSI*

Overall, the distribution of the working-age population in Sofia does not change significantly. We analyse the dynamics since the last census, which has seen significant changes in the demographic picture by 2011. Over the period considered, the total number of persons of working age (from 15 to 64 years old) has shrunk from 927 000 to 902 000 people, which is mainly indicative of the aging of the population; however, this does not necessarily create a problem for the state of the workforce as the employment of people before and at retirement age is gradually increasing.

It is also worth mentioning the demographic replacement indicators as they outline the future dynamics of the workforce. Of paramount importance is the ratio of the number of the population aged 15-19 to the age of 60-64, as they relate directly to the change in the number of persons of working age. In 2018, this ratio for the city was 72.4 people aged 15-19, for every 100 in the 60-64 years age group. Although this value is more favourable than in all other Bulgarian regions except Sliven, in the long run it indicates a further contraction of the working population. The data also shows that for every 100 people in the age group of 0-14 years there are 119 people over 65, which confirms the trend of slow aging.
4. Forecast for the development of the labour market and the workforce in Sofia

4.1 Methodology in brief
The main factors taken into account when selecting an appropriate methodology for forecasting the status and trends of the labour market and the workforce of Sofia are the availability of data and the possibility of providing the most plausible forecast. As the data are relatively scarce and the purpose is to predict a future period for which there are no independent macroeconomic and demographic variables to base the forecast on, the chosen method should be autoregressive. The basic assumption is that the last five years have outlined trends in employment changes that will not undergo significant changes over the forecast period. The net coefficients derived from the autoregressive model are limited within the theoretical maximum of the population for the forecast period and the theoretical maximums in the number of employed and the number of economically active persons derived from the theoretical population maximum. In addition, the coefficients have been modified with assumptions for the availability of staff based on the structure of education in Sofia. Furthermore, the models take into account the expectations for the macroeconomic parameters of Bulgaria, presented in the Spring Macroeconomic Forecast of the Ministry of Finance of 2019, and the place of the economy of Sofia in it.

4.2 Demographic forecast
The first step in forecasting the labour force and the future state of the labour market is to estimate the total size of Sofia’s population, as well as the balance of the different age groups and genders. This serves to limit the maximum levels of employment and unemployment forecasts. The NSI population estimates can serve as a starting point for more detailed breakdowns for the years up to 2023. From these estimates, we derive the population dynamics scenarios presented in Figure 12.

Figure 12: Scenarios for Sofia population dynamics, 2011-2023

Source: NSI, IME calculations
In the three NSI Sofia population dynamics scenarios for the 2019-2023 period, the maximum number of people is approximately 1.35 million. Since the differences over such a short period are minimal, we will not dwell on the consequences of the implementation of either of the two "extreme" scenarios, but use the convergent scenario as the basis for the rest of the distributions.

One of the peculiarities of the population of Sofia is the sensitive gender imbalance – by 2018, the ratio of men/women is 0.92/1, which in turn means that in the convergent scenario of population development there will be a more sensitive nominal increase. The forecast indicates that by 2023 the number of women in the city will reach 702 000, and that of men – 647 000. However, it should be borne in mind that this difference reflects mostly the much higher life expectancy of women and that it is not equal between different age groups.

4.3 Employment forecast
The main problem when forecasting the employment dynamics in Sofia at the moment is the fact that Bulgaria’s economy is at the top of its economic cycle, and in the last few quarters certain indicators are showing a slowdown. The surge in economic activity and employment after 2013 cannot be mechanically used to predict the labour market development over the next few years. However, the forecast also presents this scenario of "unlimited" employment growth, along with more realistic ones that suggest a slowdown in economic development.

Despite Sofia’s increasing population, the number of people of working age is decreasing. The forecast indicates that while 72% of Sofia’s population was of working age in 2011, in 2023 it would reach 66%, or approximately 888 000. However, it should be borne in mind that this number does not include the population aged 65+, that is increasingly considered to be an undervalued workforce. If we include people aged 65+ as well, by 2023, the size of the workforce would be 1 136 000, or 84% of the converged population estimate, but as a whole elder people are unlikely to be willing to work for many more years.

In any case, when presenting and reviewing these forecasts, we must bear in mind that the further we move away from 2018 – the last year for which there is real data, the more inaccurate the estimates become.

Figure 13: Scenarios for employee dynamics in Sofia, 2011-2023

Source: NSI, IME calculations. Values after 2018 are estimated
Figure 13 presents three possible scenarios for the dynamics of the total number of employed in active age in Sofia (15-64 year olds; the 65+ group is not included due to the relatively small share of employees currently employed in it and the large variations in data between quarters. Their dynamics will be reviewed at the age breakdown below). All three are limited by employment caps of just over 80% of the projected volume of the working population, which is close to the maximum for the most economically developed regions of the EU. This, in turn, means that against the backdrop of a decrease in the total number of working-age population, the relative retention in the number of employed in the realistic scenario will lead to an increase in the employment rate to 77-78%. The optimistic scenario allows employment to expand close to its theoretical maximum, while the pessimistic one assumes that, in the face of an economic crisis, employers will lay off part of their workers – this is to some extent valid for 2010-2013 the period after the previous crisis. As the used macroeconomic projections represent the expected annual dynamics, the seasonal effects in the forecast data are fairly typified and derived almost exclusively from the previous dynamics. Nevertheless, they give an overall picture of the quarterly employment changes of Sofia's economy. In the analysis, we only present estimates based on the “realistic” (or baseline) scenario, as the differences with the other two are not particularly noteworthy.

Figure 14: Forecast of the age structure of the employed in Sofia, Q2 and Q4 of 2013 and 2023, in thousands

Source: NSI, IME calculations

Figure 14 shows that the most noticeable changes in the age structure between 2013 and the forecast for 2023 are expected to occur in the highest and lowest age groups.
Growth is highest among those aged 65+, but they continue to make up the smallest group of employees according to the baseline scenario. The smallest changes are in the groups covering the largest number of employees – those between 30 and 49 years old. Although the number of employees aged 30-49 years is projected to increase, this growth is relatively low. The only decline is in the youngest group, between 15 and 24 years, reflecting both the demographic dynamics of recent decades and the changing structure of the city's economy, which is moving towards industries that demand higher qualifications and skills.

The change in the educational structure involves raising the share of higher education employees to about 60% of the total employment. At the same time, the number of people with primary and lower education remains unchanged since the industries that add the biggest number of new jobs are mostly those that require higher education. It is important to note that forecasting the employment rates of those with primary and lower education is difficult due to their very small number. However, with a great deal of certainty we can say that they will not be decisive for the future structure of Sofia's economy.

**Figure 15: Forecast of the educational structure of the employed in Sofia, 2013 – 2023, in thousands**

![Forecast chart](image)

*Source: NSI, IME calculations. The forecast for those primary basic and lower education has low accuracy.*

Compared to 2013 (the last quarters of 2023 and 2013 are presented in Figure 16 below), almost all sectors, except *trade, healthcare* and 'others', are experiencing increasing employment. The most noticeable growth – more than three times – is in *real estate operations*, following the significant development of the *construction* sector over the last few years. Unsurprisingly, significant increases are expected in both sectors, where the outsourcing of business processes can be classified in both, *Administrative and supporting activities* and *Professional activities and scientific research*. Together, the two sectors will employ over 100 000 people by the end of 2023. Another large and expected increase is in the ICT sector, which is estimated to exceed 70 000 people, compared to just over 50 000 people a decade earlier.
4.4 Unemployment forecast

The analysis shows that by 2018, the number of unemployed in Sofia is already close to its natural minimum, which creates considerable difficulties in forecasting that number in the near future. As with employment, the estimate allows for a minimum level of unemployment, a fall below which is considered extremely unlikely.

The IME’s forecast for the unemployment in Sofia implies a reduction of the number of unemployed to 10 000-12 000 people by the end of the period (depending on the quarter), which in turn means that a large part of the additional employment created during the period under consideration would come from the inactive population. When forecasting unemployment, it should be borne in mind that since the number of unemployed people in Sofia is very low, the accuracy of the forecast, especially at the end of the period, is not particularly high.
Figure 17: Estimation of the age structure of the unemployed in Sofia, 2013 – 2023, in thousands

Source: NSI, IME calculations. The forecast has low accuracy

The forecast of the age structure (Figure 17) shows considerable seasonality in some age groups. It can be explained partially by the low accuracy of the data, partially by the marked seasonality of employment in some age groups, especially in the younger ones. Overall, the forecast outlines a significant increase in the share of unemployed people aged 45-54, which most likely reflects their lower labour mobility and retraining.

Regarding the education of the unemployed in Sofia, even the reported data for the end of 2018 demonstrate the practical “disappearance” of the unemployed with higher education, and it is unlikely that this process will reverse in the near future. For this reason, we do not publish the forecast of the distribution of unemployed by education, since almost all unemployed will fall into the "secondary and lower education" category in the near future.

4.5 Wages forecast

The attractiveness of individual professions and people’s interest in them largely depends on the pay levels. The IME forecast for the labour market situation also includes an assessment of the dynamics in wages over the period considered. In nominal terms, the forecast for the pay levels implies that the average monthly gross salary in Sofia will reach approximately BGN 2 000 by the end of the period under review, with almost BGN 2 200 on average for men and BGN 1 800 on average for women. The ICT sector still pays significantly higher wages than all other industries, followed by the outsourcing of business processes and the financial activities. Almost all economic activities, with the exception of the hotel and restaurant sector, are expected to exceed an average of BGN 1 000 per month, most of them – even BGN 1 500 (Figure 18, left scale)
Wage growth (Figure 19, right scale) is far from even, according to the forecast. The pay in agriculture will increase the most (thanks to a very low base), as well as wages in administrative and support activities (as the outsourcing industry will expand). The increase in these two activities will exceed 1/3 of the current pay levels. In most industries, projected growth for the 2018-2023 period is between 20% and 30%, with the exception of culture and sports, where it is only 15%.
5. Main conclusions

- Employment in Sofia has reached 75% of the active population, with the number of employees varying around 700,000 people in the different quarters due to seasonality.
- The distribution of employees by gender is relatively even.
- The number of employees has increased over the last five years in all educational groups, which indicates a gradual exhaustion of the free labour force.
- More than half of the employees in Sofia in 2018 are 30-49 years old, but in recent years there has been a significant increase in employment among older people.
- Employment is growing in all economic activities except trade and healthcare with the most significant growth being observed in the ICT, outsourcing and real estate sectors.
- Between 2013 and 2018, the number of unemployed in Sofia dropped significantly, from 60,000 to 13,000 people.
- The remaining unemployed are relatively evenly distributed across the age groups, with a slight predominance of those aged 15-34, mostly with secondary and lower education.
- The last five years have been a period of high wage growth. The ICT sector is leading that trend offering a gross monthly salary of over BGN 3,000 in the end of 2018.
- Higher education in Sofia is still dominated by the economics and social sciences majors, but in recent years there has been an increasing interest in mathematical and technical specialties.
- Although Sofia's population is growing and exhibits relatively good demographic indicators, the number of working-age population will shrink to about 890,000 people by 2023, according to the IME forecast.
- The realistic scenario for employment development presupposes the relative retention of the absolute number of employees and an increase in the employment rate of working-age people close to the maximum level for a healthy economy of about 78-79%.
- The IME forecast indicates that the age structure of employees will change. The most significant change will be the increase in the share of 40-49 year-old employees.
- Within the forecast period, a considerable increase is expected in the share of employees with higher education, and a drop in the share of those with secondary education.
- Following the current dynamics, in the next five years the city economy will add new employment predominantly in ICT and outsourcing, but will lose employment in health and trade.
- Due to the extremely low number of unemployed in the base period, the accuracy of their estimated number and composition is quite low; the results suggest that some 10,000 people will be unemployed, mostly with secondary education.
- The salary estimate indicates that all sectors without the hotel and restaurant industry will offer a gross monthly salary of BGN 1,000 and the average salary for Sofia will reach BGN 2,000 at the end of the forecast period. Salaries in most industries will rise by 20-30%.
References


